

- 10, 10 a. *N. Austeni*, sp. nov. natural size; p. 15.
 11, 11 a. *N. falcata*, sp. nov. ditto; p. 15.
 12, 12 a. *N. Koondaensis*, sp. nov. ditto; p. 16.
 13. *N. apicata*, sp. nov. ditto; p. 16.
 14, 14 a. *Helix (Plectopylis) macromphalus*, sp. nov., magnified
 2 diameters; p. 17.
 15. *Bulimus vicarius*, sp. nov., natural size; p. 18.
 16. *Glessula filosa*, sp. nov., ditto; p. 19.
 17. *G. Singhurensis*, sp. nov., ditto; p. 19.
 * 18. *G. rugata*, sp. nov., magnified 2 diameters, 18a. do. natural
 size; p. 20.
 19. *G. lyrata*, sp. nov., var. *Matheranica*, natural size; p. 21.
 21. *G. pulla*, sp. nov., magnified 2 diameters, 20a do. natural
 size; p. 21.
 21. *G. hebes*, W. Bl an f., natural size; p. 21.
 22. *G. Tornensis*, sp. nov., ditto; p. 22.
 23. *Succinea rutilans*, sp. nov., natural size; p. 23.
 24, 24 a. *Succinea (Lithotis) tumida*, sp. nov., magnified 2 diame-
 ters; p. 23.
 25. ditto. var. *subcostulata*, ditto; p. 23.

BRIEF NOTES ON THE GEOLOGY AND ON THE FAUNA IN THE NEIGHBOUR-
 HOOD OF NANCOWRY HARBOUR, NICOBAR ISLANDS,—by V. BALL,
 B. A., *Geol. Survey of India.*

[Read 9th Oct. 1869, received 20th Oct. 1869.]

The following observations* have been made on a short trip of eight days to the new settlement at the Nancowry harbour, situated between parts of the southern coast of Camorta, and the northern coasts of the island Nancowry. To the north of the entrance of the harbour lies Trinkut, to which also a short visit has been paid. All three islands belong to the northern, or rather middle,

* An abstract of the Journal has been published in the October Proceedings of the Society for 1869, (p. 250), but as the Government of India has since resolved to publish all the available literature regarding the history and physical condition of the islands in their "Selections," the present account has been restricted to those observations which may prove of immediate interest to the scientific reader.

group of the Nicobars which, on account of the trade with coconuts and trepang are much better known to the Malayan traders than the southern larger islands. The history of the various attempts made by the Danes, Austrians and by French Missionaries for a settlement on these islands are well known from the records of the voyages of the Danish Corvette* “Galathea,” (1847), from Dr. R i n k’s† “sketch of the Physical geography and geology” of these islands, and from the manifold reports relating to the Nicobars by different members of the Austrian expedition with the Frigate “Novara,” (1858).‡ In these works much has also been published relating to the fauna of these islands, but the accounts are not always the results of personal observations, and as such, the few notes which I have to place upon record will, I trust, prove of some interest.

For the notes on the fishes collected by me, I am indebted to Dr. F. D a y, and for those on the Mollusca to Mr. G. N e v i l l.

GEOLOGY.

The geology of these islands as forming a portion of the Nicobar group has already been described by Dr. R i n k, geologist attached to the Corvette “Galathea,” and by Dr. H o c h s t e t t e r, of the “Novara.”

My field observations, I find on comparison, are simply confirmatory of the views as to the structure of these islands held by the last mentioned distinguished geologist, and which have recently been published in the Records of the Geological Survey of India.§ I do not, therefore, give them in detail here, but I shall briefly allude to the general results.

Dr. R i n k separates the sedimentary rocks into two formations, calling the clay stones and their associated conglomerates of Camorta, Nancowry, Trinkut, &c. “*Older Alluvium*”; and the sandstones and slates of the southern islands “*brown coal formation*.” Dr. H o c h s t e t t e r does not agree in this opinion, believing

* Steen Billes account of the voyage of the Corvette “Galathea” round the world, Copenhagen, Leipzig, 1852.

† Copenhagen, 1847.

‡ Voyage of the Novara by Dr. Karl Scherzer, and Results of the scientific discoveries of the Novara expedition &c.

§ Vol. II, Part 3, 1869.

that they are only "petrographically different products of one and the same period of deposition."

The sandstones and slates of the southern islands are apparently identical with those of the Andamans which I examined at Port Blair. They both contain fragments of drift wood changed into coal, and impressions of plants resembling *Fucoids*. As the two sets of rocks have not been seen, and so far as is known, do not occur in contact, it is impossible to assert anything positively with regard to their mutual relations.

If they are to be regarded at all belonging to one formation, then local circumstances must have determined the great difference in lithological character which exists between the rocks of the northern and southern islands, while at the same time the processes at work during the deposition of the formation produced uniform results at places not only so distant as Port Blair and the great Nicobar, but as Arracan and Java. Mr. B l a n f o r d has stated it as his opinion* that the Andaman sandstones, from specimens brought by Mr. S. K u r z, are identical with those of Arracan. Dr. H o c h s t e t t e r, (l. cit.) discusses the probability of the Nicobar rocks being the same age as some occurring in Java and Sumatra.

The terms "older alluvium" and "marl" which have been used by Dr. R i n k, and Dr. H o c h s t e t t e r respectively, neither accord very closely with the character of the Camorta and Nancowry rock, according to the generally accepted English system of rock nomenclature.

The term alluvium can scarcely be applied to rocks of the age of the claystones of Camorta, rocks whose strata are much disturbed, occasionally even being nearly vertical. A marl should contain some percentage of lime, the amount of which is disputed. The Camorta rocks, however, rarely contain even a trace of lime.

The rocks of these islands which determine the character of the soil are—

1st.—Coral rocks all round the coast.

2nd.—Magnesian claystones with interbedded conglomerates, of which an admirable section shewing a roll in the beds is well seen

* Report on the vegetation of the Andaman Islands, by Mr. S. K u r z, p. 2.

in Nancowry haven, on the Camorta and Nancowry shores. At the western entrance, there are great beds of conglomerate, some almost vertical, striking N. W.—S. E.

3rd.—Gabbro and Serpentinous rocks, well seen on the highlands east and west of the village of Alta Koang on Nancowry.

The coral rocks together with the sea drift form the soil in which the cocoa-nuts and vegetables cultivated by the natives grow and thrive.

The magnesian claystones, on disintegration, form a soil incapable of supporting more than a crop of grass. In the valleys where this formation occurs, the accumulating of vegetable matter &c. brought down by the streams, has proved sufficient in many cases to support a jungle of large trees. But in the hot house climate of the Nicobars, the poverty of the soil is so great, that the tops of some of the hills are perfectly bare, or are only able to support a fern, *Gleichenia dichotoma*. The presence of a conglomerate bed has the effect, by the decomposition of its contained pebbles of igneous rocks, of locally improving the character of the soil.

The igneous rocks, Gabbro and Diorites, produce a much better soil which is capable of supporting a dense jungle.

To the variability in the fertility of the soil which is thus explained is due the peculiarity of the scenery at Nancowry.

In the southern Nicobars, according to all accounts, and certainly in the Andamans, the greater uniformity is due to less variability in the character of the soils, derived from the rocks forming those islands.

As to the economic resources of the rocks, they cannot be estimated at a high rate. The coal of the southern islands is evidently similar to that of the Andamans, being simply derived from fragments of drift wood and forming little strings and nests in the sandstones in which it is imbedded. Dr. Rink discusses the possibility of gold being found in the igneous rocks. No trace of it has, however, been found. It is extremely improbable that the Nicobarians know its value.

Both Dr. Rink and Dr. Hochstetter obtained small traces of copper in the igneous rocks. This fact could not, however, be used as a proof of its occurrence in large quantities, though it might justify a closer and more extended examination of the locality.

As to the occurrence of amber* in the Nicobars, a belief which seems to be entertained by some, I can offer no decided opinion. *Prima facie* there is no argument against it; on the contrary, the rocks are such as might be expected to produce amber; but with the exception of some fossil resin, a sort of pseudo-amber found by Dr. R i n k, I have searched in vain in the accounts of the Nicobar islands for any reliable testimony of its occurrence, or even of its having been seen with the natives, though it is mentioned incidentally in one account as being one of the exports. I am strongly inclined to believe that the ambergris which is found on the shores and exported, has given rise to the belief in the existence of amber.

FAUNA.

Mammals.

I did not succeed in obtaining any mammals; they appear to be very rare near the settlement. The evidence in favor of Buffaloes existing on the island of Camorta has as yet not received further confirmation than what we know from the records of Dr. R i n k. The animal does not appear to have as yet been seen by any European, but foot-prints were observed. A few species of monkeys, bats and others† have been noticed by Mr. Blyth (J. Asiat. Soc., Vol. xv, p. 367), and in the Novara scientific report.

Birds.

During the short period of my stay in the Nicobar islands on the hulk anchored off the new settlement on Camorta, my time was principally taken up by long boat trips to various parts of the neighbouring islands of Nancowry and Trinkut; I had, therefore, but little leisure for making a collection of birds. I am unable to add to the scanty avifauna of the island, as already known, the description of a single new species. Two birds were, however, observed by me which have not hitherto been recorded, unfortunately I did not procure specimens of either: they were a small Quail, *Turnix sp.?* and a species of *Ægialitis* (possibly *Æ. minutus*).

* The reference to *amber* has no doubt originated in the word *ambra* which is generally used in German accounts, signifying *ambergris*. (Stoliczka.)

† I have lately obtained through my collector a very interesting species of *Murinae*, but it has not yet been identified. (Stoliczka.)

That the number 45 which, so far as I can ascertain, is about that of the birds hitherto found in the Nicobars, represents more than a small proportion of the birds actually existing in the islands, is difficult to believe. Still it is singular that the collection made by Captain Lewis and Mr. Barbe, and described by Mr. Blyth in 1846, is, with a few exceptions, simply repeated by mine of the present year.

The principal result to be recorded is, that I have been able to compare several Andaman and Nicobar forms as to the identity of which some doubt existed; of these the principal to be noticed are, *Palæornis Nicobaricus*, Gould, *P. erythrogenys*, Blyth; *Geocichla innotata*, Blyth, *G. albogularis*, Blyth; *Eulabes Andamanensis*, Tytler, &c.

From my specimens, the Andaman and Nicobar Imperial Pigeons would appear to be quite distinct species, the vinaceous tinge being present in the former and quite absent in the latter, which is also a slightly larger bird. This question has, however, already been discussed by Mr. Blyth.

1. *HALIÆTUS LEUCOGASTER*.—A pair of fishing eagles, apparently belonging to this species, were frequently seen in Nancowry haven. They seemed to live chiefly on refuse from the ships which they picked off the surface of the water.

2. *PALÆORNIS NICOBARICUS*, Gould.—Proc. Z. S., 1866, p. 555; Birds of Asia, 1857, Pl. IX; *P. erythrogenys*, Blyth, J. A. S. B., 1846, XV, p. 23, and 1858, XXVII, p. 81. Ibis N. S. 1867, III, p. 319. Novara Exp., Vögel. 1865, p. 97.

This bird is very abundant both at the Andamans and Nicobars. I obtained two specimens in the latter islands. The natives also brought for sale some live birds, which they had captured with bird lime.

The adult male has the upper mandible a beautiful cherry red. The young male, as in other species of *Palæornis*, has the plumage and bill colored as in the female. The brilliant red of the cheeks fades much in dead specimens.

In the Andamans I used to see large flocks of these birds passing Viper island every day, going to and returning from their feeding grounds.

3. *TODIRAMPHUS OCCIPITALIS*, Blyth.—J. A. S. B., XV, pp. 23, 51; *Halcyon occipitalis*, Novara Exp., Vögel, p. 46.

This noisy bird may frequently be seen perched on the bushes in the clear spaces near the new settlement on Camorta. It also frequents trees on the sea coast.

4. *NECTARINIA PECTORALIS*, Horsf.—Pl. Col. 138. I shot a female on Camorta. The bird appeared common in the forest near the old Danish settlement on Nancowry.

5. *ZOSTEROPS PALPEBROSUS*, Tem.—Pl. Col. and J. A. S. B., XV, p. 370. Shot a female of this species also on Camorta.

6. *HYPsipETES VIRESCENS*, Blyth.—J. A. S. B., XV, p. 51; *H. Nicobariensis*, Horsf. and Moore, Cat. East India Mus., I, p. 257; Novara Exp., Vögel, p. 76, Pl. iii, fig. 2. Probably abundant on Camorta, shot one specimen.

7. *MYRAGRA AZUREA*, Bodd.—Birds of India, I, p. 450. *M. coerulea*, Blyth, J. A. S. B., XV, p. 370. My specimen which was shot on Trinkut, appears to be the young of this species, but it is not in sufficiently good order for one to be certain of its identity.

8. *GEOCICHLA INNOTATA*, Blyth, J. A. S. B., XV, p. 370; *G. albogularis*, Blyth, J. A. S. B., XVI, p. 146; Ibis N. S., III, 325. My specimen from Camorta corresponds exactly with one in the Indian Museum labelled by Blyth, *G. innotata* from the Nicobars, but for which he suggested *l. c.* the name *albogularis*. Both have the wing $\frac{3}{8}$ of an inch shorter than an Andaman specimen, while they are exactly the same size as in another specimen, apparently too from the Andamans.

9. *ORIOIUS MACROURUS*, Blyth.—J. A. S. B., XV, p. 46; Novara Exp., Vögel, p. 74. This well marked Oriole seems tolerably abundant; I also saw another species, distinct from *melanocephalus*.

10. *EULABES ANDAMANENSIS*, Tytler.—Ibis, New Series, III, p. 32; *Gracula Javana*, Cuv., in Exped. Novara, Vögel, p. 88; *G. intermedia*, A. Hay, apud Blyth, Adventures and researches among the Andaman Islanders, Appendix, p. 359.—Procured a specimen of this Maynah on Camorta. A very much injured skin given to me in the Andamans, enabled me to compare the birds from both localities. I can detect no difference between them; this confirms Lord Walden's belief as to the bird extending to the Nicobars. (Vide "Ibis," New Series, III, p. 331).

11. *C. INSULARIS*, Blyth.—Adventures and researches among the Andaman Islanders, Appendix, p. 361; *Carpophaga sylvatica*, var. *Nicobarica*, Tickell, J. A. S. B., XV, p. 371; *C. Aenea*, var. *Nicobarica*, Novara Exp., Vögel, p. 105. As to the distinctness of this bird from true *sylvatica* there can be no doubt. It is in every respect a larger bird than the one from the Andamans which is identical with specimens of *sylvatica* from Cachar and Manbhúm, Damin-i-Koh, &c.

	<i>Bill to gape.</i>	<i>Wing.</i>
Nicobar Bird,	1½ inch	10 inch.
Andaman Bird,	1¼ inch	9¼ inch.

There is a total absence of the vinaceous tinge on the lower parts of the Nicobar bird. The feathers of back, wings and tail are a bluish bronze, those of the Andaman and Indian birds being greenish bronze.

12. *CARPOPHAGA MYRISTICIVORA*, Scop.—J. A. S. B., XV, 371; *C. bicolor*, Scop. Blyth, Cat, 1406; Novara Exp., Vögel, p. 107. This bird is tolerably abundant, feeding on the same fruits as the last species.

13. *CHALCOPHAPS INDICA*, Lin n.—J. A. S. B., XV, 371; Novara Exp., Vögel, p. 110. I saw this bird on several occasions, but did not procure a specimen. When startled, it often flies close past one's face.

14. *MACROPYGIA RUFIPENNIS*, Blyth.—J. A. S. B., XV, 371; Novara Exp., Vögel, p. 109. A small flock of these birds was seen during my stay on Camorta.

15. *CALENAS NICOBARICA*, L.—J. A. S. B., XV, 371; Ibis N. S. III, 332; Novara Exp., Vögel, p. 110. This beautiful bird cannot be very common, as I did not succeed in seeing a single specimen. Probably, as Mr. Wallace found in the Malayan Archipelago, it is chiefly confined to the very small islands where it can feed unmolested on the fallen fruits. The Novara Expedition procured a specimen on the small island of Treiss.

16. *MEGAPODIUS NICOBARIENSIS*, Blyth.—J. A. S. B., XV, 372; Novara Exp., Vögel, p. 110, Pl. iv, figs. 1—3. This bird seems to be tolerably abundant on Camorta. I shot three specimens one morning close to the settlement. The first of them had flown into a tree, much in the manner that Indian jungle fowl do when suddenly startled.

It has a peculiar not easily describable call, consisting of a guttural sound, reminding one of the croak of a bull-frog; it may be perhaps represented by the syllables *Kiouk, Kiouk, Kōk Kōk Kōk* repeated. Some who had heard this call, assured me that there were peacocks on the island, but it has no resemblance to the cry of a peacock. Unfortunately, by an accident, I did not examine the birds myself; but if my bird-skinner has not deceived me, there is but little if any difference between the sexes. By a most fortunate chance, on the very day upon which I got the birds, the Nicobarese brought two of the eggs to the ship for sale.

The dimensions of a bird measured in the flesh are as follows:—

Length, bill to tail,	15½ inch.
Length, bill to claw,	19½ „
Wing,	9¼ „
Extent, about	27 „
Bill, from gape,	1⅛ „
Tarsus,	3 „
Claws,	⅞ „
Girth,	9½ „
Eyes, dull orange yellow.	

	<i>Length.</i>	<i>Circumference.</i>
Egg, No. 1,	3 $\frac{5}{16}$	6 $\frac{3}{8}$
Ditto, No. 2,	3 $\frac{1}{8}$	6 $\frac{3}{8}$
Colour, brick red.		

The only remaining egg in the Indian Museum of those mentioned by Blyth has become quite white.

17. *TURNIX* SP. ?—Saw several specimens of a small dark quail, one which I shot was lost in the long grass. The legs appeared to be deep orange, as in *T. Dussumieri*.

18. *NUMENIUS PHÆOPUS*, Linn.—I saw a small flock of whimbrel perched on some trees bordering a creek on the island of Trinkut; one which I shot is almost identical in length of bill and other variable characters with a specimen obtained by Mr. Blyth in the Calcutta bazar, and which is now in the Indian Museum. This bird is also recorded from the great Nicobar by the Novara expedition.

19. *ÆGIALITIS*, SP. ?—I saw a small plover, either *Æ. Philippensis* or *minutus*, feeding near the water line on the beach at Nancowry.

20. *DENUGRETTA CONCOLOR*, Blyth.—*Ardea concolor*, Blyth; Novara Exp., Vögel, p. 122. I procured a specimen of this bird near the western entrance of Nancowry haven, where it was feeding along the shore.

I saw several young birds of I believe the same species in captivity at the Andamans. The dimensions of the bird which I shot, measured in the flesh, being somewhat different from those given by Mr. Blyth, I append them here. Colour senty ashy throughout, darker on the inner web of the secondaries and tertiaries and on the tail; underneath the wings silvery ashy, occipital plumes consisting of decomposed feathers about $1\frac{1}{2}$ inches.

Scapulars much developed, some extending to the end of the tail.

Wing,.....	10 $\frac{3}{4}$ inch.
Tail,	4 ,,
Extent,	38 ,,
Bill,.....	3 $\frac{1}{2}$,,
Tarsus,	3 ,,

Legs dirty yellow, inside of toes bright yellow. Iris bright yellow, pupil large.

20. *Ardeola leucoptera*, B o o d.—I think I saw an individual of this species perched on the mangrove roots in a creek on the island of Trinkut. He escaped wounded, so that I cannot be sure of his identity.

21. *Onychoprion melanauchen*, T e m m.—Very abundant both on the Andamans and Nicobars, breeds on the rocky islets.

NOTES ON THE FISHES; *by* Surgeon F. Day.

I have examined 21 specimens of fish presented to the Calcutta Museum, by V. Ball, Esq., who collected them at the Nicobars; they belong to the following eleven species.*

* During my short visit to the Nancowry haven in October last, and afterwards through my collector, whom I have sent on two subsequent occasions

- 1 *Serranus Sonnerati*, C. V.
- 2 *Ambassis Dussumieri*, C. V.
- 3 *Caranx hippos*, Linn.
- 4 *Sillago sihama*, Forsk.
- 5 *Trypauchen vagina*, Bl. Schn.
- 6 *Atherina Forskali*, C. V., 5 specimens.
- 7 *Pomacentrus punctatus* ? Qu. and Gaim.

D $\frac{13}{15}$, A $\frac{9}{14}$, L. 1. 28.

Height of body $\frac{2}{5}$: length of head $\frac{1}{4}$: of caudal $\frac{2}{9}$ of the total length. Preorbital denticulated, longer than deep, a notch between it and the suborbital ring, caudal lobed, the upper the longest. The dorsal spines gradually increase in length to the last. Colour brownish, head dotted, a light spot on each scale ; a blackish brown band, anteriorly edged with white, exists upon the free portion of the tail posterior to the dorsal fin : opercles darkest superiorly.

8. *Nuria malabarica*, Day (variety), two specimens each $2\frac{1}{2}$ inches long. Pectorals elongated reaching to the middle of the ventrals, barbels extending to the base of the ventrals. A well marked black spot at the root of the caudal fin.

9. *Chupea Neohowii*, C. V., five specimens.
10. *Chatoëssus chacunda*, H. B.
11. *Temera Hardwickii*, Gray.

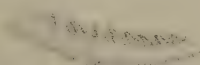
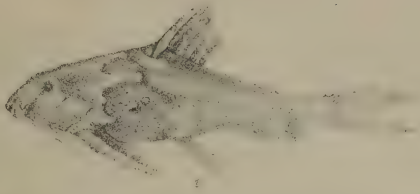
GENERAL REMARKS ON THE MOLLUSCA, by G. Nevill, Esq.

The collection of Mollusca* made by Mr. Ball at the Andamans and Nicobars, though not very extensive, still includes a few very to the Andamans and Nicobars for the purpose of chiefly collecting *Reptiles* and *Mollusca*, I have also obtained above 30 species of fishes, among which there are several new species. Dr. Day is at present engaged in an examination of these. (Stoliczka.)

* I now possess about 20 species of land-shells from the Nicobars, and a somewhat larger number from the Andamans; from both groups of islands there are several interesting new species, the descriptions of which are now in preparation. Of marine shells I obtained on my own visit, and through my collector who was most kindly aided by Capt. Rundall, about 200 species from the Nicobars, and about 300 species from the Andamans. From the latter I have a large number of little shells, chiefly obtained with the dredge.

important forms, to any one who takes any interest in this branch of the marine fauna of the Indian seas; amongst them is a species of *Corbis*, and several new and interesting forms of different genera, belonging to the *Mitridæ*, *Pleurotomidæ*, *Nassinæ*, &c. identical or very similar to Philippine species, and which I have never found, or heard of, from places further west, not even from the coast of India. From the data which I, up to the present, possess, the Marine Molluscous Fauna of the Andamans seems to me nearest allied to that of Arracan—of late most ably worked out by Mr. W. Theobald with the assistance of Mr. S. Hanley, that of the Nicobars approximating more closely to that of Singapore. There is one great difficulty everybody out here has to contend with, who is desirous of working on the range of species in the Indian seas, that is, the absence, in all of the Calcutta Libraries, of Krauss' "Süd-Afrikanische Mollusken," a standard work of primary importance for this subject. From the small collection I was able to make at Natal, and from that of Mr. Blanford's from Annesley Bay, I should say the species ranging as far as these places are but very few in number: *Cypræa annulata*, *helvola*, and *pellis serpentis*, *Purpura tuberculata*, *Nerita albicilla* and *polita*, *Natica mamilla* and one or two others, the number of species common to both increases considerably at the Seychelles and Bourbon, and still more at Ceylon. Of the 128 species collected by Mr. Ball, 70 are well known forms and widely spread in our seas; amongst the rarer or more local species, I may mention *Conus zonatus*, *marchionatus* and *mustelinus*, *Mitra plicata*, *Grüneri*, *semifasciata*, *cruentata*, *exasperata*, *flamigera* (?), and 3 probably new species. *Phos Blainvillei*, *Pleurotoma abbreviata* and *tigrina*, *Cerithium Traillii* and *alveolus*, *Strombus columba*, *Columbella* ?, *Rapa papyracea*, *Trochus fenestratus*, *Euchelus foveolatus*, *Polydonta incarnata*, *Purpura musica* and *bitubercularis*, *Murex nigri-spinosus* and *adunco-spinosus*, *Natica albula* and n. s. (?), *Actæon coccinata*, *Tectura Borneen-*

When at the Andamans I have with pleasure observed the collecting zeal of many of the officers of the settlement, and I have little doubt that their exertions will soon enable us to obtain a very fair knowledge of the Molluscous fauna of these islands. Dr. Day on his late visit in connexion with the fisheries has also collected largely mollusca, both land and marine shells. [Stoliczka].



1. b.

1. c.



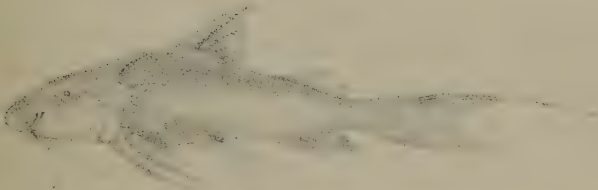
2. b.

2.

2. c.



2. a.



3



3 a



3. b



3. c.

1. *Hara Buchananii*; 2. *H. Jerdoni*; 3. *H. Cona*;